



University of West Florida and Institute for Human and Machine Cognition

PhD Program in Intelligent Systems and Robotics

1. Introduction

The PhD program in Intelligent Systems and Robotics (ISR) is designed to train the next generation of educators and researchers to develop technology combining human and machine elements. Beyond coursework, the program's cornerstone will be hands-on, leading-edge research in intelligent systems and robotics and will leverage the proximity and talent of UWF faculty and IHMC Researchers.

2. Outcomes

By completing the Ph.D. in Intelligent Systems and Robotics degree program, students will attain the following competencies:

Content

- Analyze, synthesize, and evaluate concepts and models for intelligent systems and robotics, including analyses based on relevant mathematics, statistics, engineering as well as concepts related to computer science, artificial intelligence and machine learning.
- Construct and complete a dissertation that advances knowledge in a focused area of research related to intelligent systems and robotics.
- Design and create specific hardware and/or software that demonstrates proof of concept in conjunction with coursework and dissertation.

Critical Thinking

- Identify, describe, and appraise the significance of unresolved research questions pertaining to intelligent systems and robotics.

Communication

- Analyze, synthesize, and communicate research results in oral and written form.

Integrity/Values

- Demonstrate and apply salient professional ethics to the implementation of research.

Project Management

- Design and conduct team-based research in the field of intelligent systems and robotics, and draw defensible conclusions from that research.

3. Admission Standards:

The following are required for consideration:

- Submission of the **Graduate Record Exam (GRE)**. Attainment at the 70% percentile is preferred (may be waived in a case by case basis).
- Hold a **master's degree** in Computer Science, Mathematics, Engineering, Physics, or a similar technical degree. **Bachelor's candidates** with strong relevant industrial experience or research aptitude will be considered. Those without a background in algorithm analysis, data structures, and advanced computer programming skills will require additional preparatory work.
- Master's or bachelor's cumulative **GPA** - minimum of a 3.0 GPA; however, successful applicants will typically have GPAs well above the minimum.
- Submission of a **resume or CV**.
- Submission of a **personal statement** describing prior experiences and accomplishments in intelligent systems and robotics, and an indication of the student's goals in pursuing the current degree.
- A minimum of **three letters of recommendation** are required from academic and professional recommenders attesting to the applicant's graduate studies potential. At least one of the letters of recommendation submitted must be from an academic reference. All letters of recommendation must be on official letterhead of the recommender's institution or organization and must have their official written signature.
- Applicants from countries where **English** is not the official language must also demonstrate proficiency in English. The Admissions Committee reserves the right to conduct telephone interviews with these applicants. For a complete listing of admission requirements for international applicants, please visit the UWF International Graduate Admission section of the catalog.

4. Advancement to Candidacy

- Completion of a **minimum** of 9 SCH for students entering the program with an approved master's or 18 SCH for candidates entering the program with an approved bachelor's degree.
- Passing a **comprehensive qualifying exam**. The oral qualifying exam typically takes place in the fifth semester, administered by the PhD committee. The PhD committee compiles a reading list the student is responsible for in the oral qualifying exam. The purpose of this exam is to ensure the student is qualified to do independent research. The student is tested over a set of selected topics related to the student's research area. The student is informed about the material covered on the exam during the semester preceding the exam. The exam may start with a short presentation by the student and is followed by questions from the committee. The oral qualifying exam must be passed before the end of the fifth semester; it can be re-taken at most once.
- **Prospectus presentation**: At the beginning of the student's seventh semester, the PhD committee the original three members and the external fourth member attend an oral prospectus presentation given by the student. In the presentation,

the student describes the central problem that will be addressed in the dissertation, including the background needed to place the problem properly in perspective. The purpose of the presentation is to give the student feedback about the proposed problem and to suggest additional issues that may be relevant to the proposed research. A final written prospectus of 3-5 pages in length that describes the proposed PhD research must be approved by the PhD committee, no later than the end of the semester in which the prospectus presentation takes place.

5. Dissertation

All doctoral candidates are required to work with one or two faculty mentors to conduct, document, and publicly defend a piece of original research.

5.1 Graduation Requirements

- Students will complete a minimum of 9 SCH of core didactic coursework in Intelligent Systems and Robotics (Refer to Section 6 for course descriptions).
- Students will complete a minimum of 9 SCH of elective coursework in their specialization area.
- Students who enter the degree program without a master's degree are required to complete an additional minimum of 9 SCH in their specialization area.
- Students will complete a Qualifying Examination and Prospectus presentation.
- Students will complete a minimum of 24 SCH of dissertation. The dissertation will consist of original research designed and conducted under the supervision of a dissertation advisor.

5.2 Dissertation Committee

Student and supervisor(s) will assemble a dissertation committee consisting of the research advisor(s) and a minimum of three other members. Members of a committee cannot all belong to the same institution. Preferably a committee would include at least a member from IHMC, one from UWF and, possibly, one from another institution. The student will write a dissertation proposal, defend it before the committee tentatively at the end of the second and third year for, respectively, students with and without a master, and conduct the dissertation research study once the proposal has been approved by the committee. The student will then write the results in the dissertation document and defend the study before the committee.

6.2 Core Courses

All students are required to take:

- Research Methods in Intelligent Systems and Robotics (3 SCH)

And one of the following two foundations courses:

- Foundations of Intelligent Systems (3 SCH)

- Foundations of Robotics (3 SCH)

If a student takes Foundation in Intelligent Systems, the third core course can be one of the following:

- Foundations of Robotics
- Special Topics in Intelligent Systems
- Intro to Data Science and Machine Learning

If, instead, the student takes Foundations of Robotics, then, the third core course can be one of the following:

- Foundations of Intelligent Systems
- Special Topics in Robotics
- Intro to Data Science and Machine Learning

6.3 Additional courses for students without a Master's

Students without an approved Master's degree are required to take additional 9 SCH equivalent to 3 courses. The intended purpose of these courses is to provide the student with the required background knowledge to become involved and active in research. These courses will be chosen by the supervisor and the student. The only requirement is that they are listed at the 5000 level or higher.

6.4 Elective Courses

Any core course, beyond the three required, can be counted as an elective. Availability of elective courses may change from semester to semester and special "una tantum" courses may be offered by guest lecturers. Credits for electives and additional courses can be obtained by attending more than three standard 3 SCH courses such as graduate international schools with supervisor's approval.

Some examples of electives included in the catalog are listed below.

- Intelligent Agents (3 SCH)
- Advanced Data Mining (3 SCH)
- Human Agent/Robot Teamwork (3 SCH)
- Topics in Natural Language Processing (3 SCH)
- Advanced Topics in Intelligent Systems and Robotics (3 SCH)
- Multivariable Linear Control Systems (3 SCH)
- Bipedal Walking Robots (3 SCH)
- Wearable Robotics (3 SCH)
- Deep Reinforcement Learning (3 SCH)